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Disposable income, unemployment, inflation and state spending in a dynamic political-economic model

van der Ploeg, F.

Publication date:
1990

Document Version
Publisher's PDF, also known as Version of record

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Citation for published version (APA):
van der Ploeg, F. (1990). *Disposable income, unemployment, inflation and state spending in a dynamic political-economic model*. (Reprint Series). CentER for Economic Research.

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Disposable Income, Unemployment,
Inflation and State Spending in a
Dynamic Political-Economic Model

by
F. van der Ploeg

Reprinted from Public Choice,
Volume 60, 1989



Reprint Series
no. 4

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Address: Hogeschoollaan 225, P.O. Box 90153, 5000 LE Tilburg, The Netherlands
Phone : +31 13 663050
Telex : 52426 kub nl
Telefax: +31 13 663066
E-mail : "center@htikub5.bitnet"

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Disposable income, unemployment, inflation and state spending in a dynamic political-economic model

F. VAN DER PLOEG*

The London School of Economics, London, WC2A 2AE, UK and Tilburg University, 5000 LE Tilburg, The Netherlands

Abstract. This paper formulates a medium-term macroeconomic model of disposable income, unemployment, inflation and state spending, proposes a theory of qualitative choice to explain electoral popularity in terms of these variables and develops three approaches to the formulation of political-economic policy. The first approach is static, sets the tax rate to reconcile the interests of various pressure groups and yields a political trade-off between the private and public sector. The second approach relies on maximizing the probability of winning the next election and gives rise to a political business cycle unless the electorate votes strategically. The implications of crowding out of private investment under alternative monetary rules, autonomous behaviour of the state bureaucracy and tax-indexation for the political business cycle are also examined. The third approach analyzes the objective of maximizing the uninterrupted length in office. It yields a short-run political cycle superimposed on a longer cycle.

1. Introduction

The theory of economic policy views the government as a benevolent dictator who implements policy in an attempt to promote social welfare. It is concerned with how a government *ought* to behave, so that it has a *normative* character. It ignores the fact that a government has objectives of its own, manifested in its ideology and its attempts to secure re-election, which may well differ from the social welfare objective. *Positive* theories of how a government *actually* behaves are needed and provided by political economics (e.g., Kalecki, 1943; Nordhaus, 1975; Lindbeck, 1976; Frey, 1978b). They are the subject of this paper.

Existing theories of political economics (see surveys in Frey, 1978a; and 1978b) suffer from at least three problems. Firstly, most studies relate popularity to economic performance in an ad-hoc manner and therefore lack a satisfactory theory of voting behaviour. Secondly, the public sector is usually not separated into the component which does *not* depend on the electorate for survival, e.g., the state bureaucracy and the monetary authorities, and the part which does depend on re-election for its survival, the government. In practice there may be conflict between these components of the public sector, which so

* The author thanks Vani Borooh, Wim Driehuis and Frans van Winden for their useful comments.

far has been ignored. Thirdly, previous studies of the optimal political business cycle (e.g., Nordhaus, 1975; Frey and Ramser, 1976; MacRae, 1977) focus on the political trade-off between inflation and unemployment and ignore the effects of real personal disposable income and state spending on electoral popularity. Furthermore, these studies do not discuss the policy instrumentarium necessary to attain the optimal unemployment trajectory.

This paper attempts to remedy the above deficiencies by postulating a complete macroeconomic model of the economy (goods, money and labour markets) and the bureaucracy (Section 2), proposing a theory of qualitative choice to explain electoral popularity (Section 3), discussing optimal approaches to the formulation of political-economic strategies for the government and examining the implications of such strategies within the context of a *closed* political-economic system (Sections 4–8).

2. The economy without political feedbacks

Instantaneous equilibrium of the goods and the money markets are described by the IS- and LM-curve, respectively. The IS-curve is given by¹

$$Q = C(Q - \tau Q) + I(r - p^e) + G, 0 < C_1 < 1, I_1 < 0 \quad (1)$$

where Q , C , I , G , τ , r and p^e denote respectively real output, personal consumption, private investment, government consumption, the direct tax rate, the nominal interest rate and the expected rate of inflation. For simplicity it is assumed that there is only direct taxation, all interest payments to the personal sector are saved, wealth effects are not present in the consumption function and the stock of capital is fixed in the short run. Investment simply depends on the expected real rate of return on the alternative asset, $(r - p^e)$. The assumption relating to investment are not too unrealistic, since this paper focuses on the length of an election period and therefore concentrates on rather short-term effects. The money market is described by the LM-curve, which is given by

$$M/P = L(Q, r - p^e, -p^e), L_1 > 0, L_2 \leq 0, L_3 \geq 0 \quad (2)$$

where M , L and P denote respectively the supply of money, the demand for cash balances in real terms and the price level. The agents in the economy demand money to finance transactions, captured by Q , to finance speculation activities, explained by the return on bonds, $(r - p^e)$, in relation to the return on cash, $-p^e$, and hold money for precautionary purposes. The effects of wealth on the demand for money are ignored.

Equations (1) and (2) may be solved to obtain the level of output and the real rate of return which ensure simultaneous equilibrium of the goods and money markets. Thus the level of output may be expressed as

$$Q = Q^*(G, \tau, M/P, p^e) \quad (3)$$

where

$$Q_1^* = [1 - (1-\tau)C_1 + I_1L_1/L_2]^{-1} > 0,$$

$Q_2^* = -C_1QQ_1^* < 0$, $Q_3^* = (I_1/L_2)Q_1^* \geq 0$, $Q_4^* = L_3Q_3^* \geq 0$ and similarly for the real rate of return on bonds, $(r - p^e)$. The multiplier for public demand, Q_1^* , is positive and inversely related to the propensity to save. Typically $Q_1^* > 1$, unless the depressing effects of a higher interest rate on private investment, called 'crowding out', are large, that is unless $I_1L_1/L_2 > (1 - \tau)C_1$. Cuts in direct taxation and increases in the real supply of money also stimulate demand. An increase in the expected rate of inflation makes holding bonds more attractive than holding money, hence raises the price of bonds and stimulates investment and output.

The government budget constraint shows that the public sector deficit, defined as public spending plus interest payments on the public debt minus taxes, is financed by either printing money or issuing more bonds. It is given by

$$\dot{B}/r + \dot{M} = P(G - \tau Q) + (1 - \tau)B \quad (4)$$

where B denotes a perpetual bond of price $1/r$, and implies that of the four policy variables available to the government only three can be chosen independently. In this paper the issuing of bonds follows residually whilst the government chooses policy rules for G , M and τ . The first part of the RHS of (4), $P(G - \tau Q)$, is called the (primary) fiscal deficit.

The first rule comes from bureaucratic considerations, since the government allows the state to expand demand as long as the costs of the state do not exceed a certain fraction, say ζ , of national output. This may be modelled by the constraint

$$G - \tau Q \leq \zeta Q \quad (5)$$

where the magnitude of the parameter ζ indicates the degree to which the government is prepared to finance a large state. A constraint of the form (5) has been important for some time in the British political debate, where the Conservative administration had a ranged of 4.75% – 1.5% for the value of ζ in mind. A more Keynesian administration would probably operate with a

somewhat higher value of ζ . The constraint on the state is binding when one makes the assumption of a budget-maximizing bureaucracy, which is a familiar assumption in the public choice literature (Niskanen, 1971; Mueller, 1979). When the constraint on the state is binding, the multipliers of (3) may be re-expressed in terms of G , M/P and p^e whilst τ is used to meet the constraint on the state (5). Upon substitution of $\tau = (G/Q) - \zeta$ into (3), one obtains

$$Q = Q^{**}(G, M/P, p^e) \quad (6)$$

where $Q_0^{**} = Q_1^{**}/(1 - C_1)$ equals the multiplier for output with respect to the autonomous components of demand,

$$Q_1^{**} = (1 - C_1)/[1 - (1 + \zeta)C_1 + I_1L_1/L_2] > 0,$$

$Q_2^{**} = (I_1/L_2)Q_1^{**} \geq 0$ and $Q_3^{**} = L_3Q_2^{**} \geq 0$. The multipliers in (6) assume that crowding out is sufficiently large or that ζ is sufficiently small to guarantee the normal result $Q_1^{**} > 0$. The case $\zeta = 0$ corresponds to the familiar Balanced Budget Multiplier Theorem (Haavelmo, 1945), which gives $0 < Q_1^{**} \leq 1$ and a somewhat smaller multiplier than before ($Q_1^{**} < Q_1^*$). Hence, if the expansion of public demand is completely financed by an increase in direct taxation, output increases nevertheless. Relaxation of the state constraint (5), or less crowding out, increase the scope for demand management.

The monetary authority follows a simple growth rule for the nominal supply of money, that is

$$\dot{M} = mM \quad (7)$$

where m denotes the exogenous growth rate of the supply of money.

To close the model an explanation of prices is needed. Assume that firms have significant market power in the goods market and use this power to set prices in order to maintain a certain desired share of profits in value added. This hypothesis implies that

$$p = \dot{P}/P = w - \omega_1 \quad (8)$$

where p , w and ω_1 denote respectively the rate of price inflation, the rate of wage inflation and the rate of labour-augmenting technical progress. Assume that workers, represented by unions or labour syndicates, have significant bargaining strength in the labour market and use this to compensate themselves (partially) for increases in the cost of living and taxation. This hypothesis may be proxied by the price- and tax-augmented Phillips-curve

$$w = \mu_0 - \mu_1 u + \mu_2 p^e + \mu_3 \Delta / (1 - \tau), \mu_i \geq 0, i = 1, 2, 3, \quad (9)$$

where Δ denotes the expected change in the rate of taxation and u denotes the rate of unemployment. A similar relationship has been used by Turnovsky (1974), who also allowed for the implications of progressive taxation on μ_2 and μ_3 . Workers bargain, at least partially, over after-tax wages and μ_3 measures the success of labour in shifting the tax burden to firms. The tax term in the wage equation implies that workers do not value public spending as much as their own private consumption.

Since the paper is primarily concerned with the intermediate term, Okun's (1970) law may be used to explain unemployment in terms of output only:

$$u = \lambda(\bar{Q} - Q), \lambda > 0 \quad (10)$$

where \bar{Q} denotes full employment output.

Combining equations (8)–(10) gives the reduced form price equation

$$p = \mu_1 \lambda Q + \mu_2 p^e + \mu_3 [\Delta / (1 - \tau)] - \omega \quad (11)$$

where $\omega = \omega_1 - \mu_0 + \mu_1 \lambda \bar{Q}$. Upon substitution of (3) into (11), one obtains

$$p = p^*(G, \tau, M/P, p^e, \Delta) \quad (12)$$

where $p_i^* = \mu_1 \lambda Q_i^* > 0, i = 1, 3, p_2^* = \mu_1 \lambda Q_2^* < 0, p_4^* = \mu_1 \lambda Q_4^* + \mu_2 > 0$ and $p_5^* = \mu_3 / (1 - \tau) > 0$. Hence, increases in public demand, the supply of money or the expected rate of inflation raise output, cut unemployment and therefore increase the rate of inflation. The expected inflation rate also exerts an independent influence on the inflation rate. A permanent cut in the tax rate has two effects on inflation. The first is to stimulate output and to increase the rate of inflation permanently. The second effect is a transient increase in the inflation rate, due to workers compensating themselves for the additional tax burden, and dies out as soon as the tax rate has reached its new level.

The last equation of the economic part of the model incorporates the adaptive expectations mechanism

$$\dot{p}^e = \mu_4 (p - p^e), \mu_4 \geq 0 \quad (13)$$

which satisfies the weak and strong consistency axioms of forecasting (Turnovsky, 1977). The average lag between an actual change in inflation and the corresponding change in the expected inflation rate, $1/\mu_4$, also serves as the average time it takes for unions and firms to agree on the compensation for an increase in the cost of living.

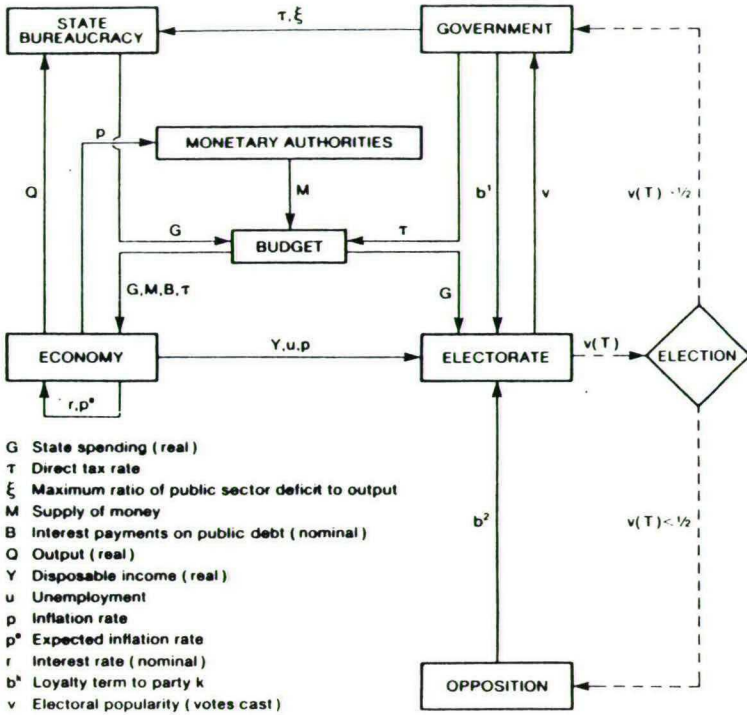


Figure 1. Interactions between the political process and the economy²

3. Electoral popularity and economic performance

Section 2 discussed the economy without taking account of the political process. Figure 1 gives a schematic view of the interactions between politics and the economy. The behaviour of the electorate and the government remains to be explained. This section discusses the influence of the performance of the government, in terms of its social and economic policies, and the opposition upon the voting behaviour of the electorate. In other words, an attempt to explain the popularity of the incumbent political party is discussed. Sections 4–8 show how electoral popularity might influence the policies adopted by the ruling political party and thus combine the economic and political models put forward in Sections 2 and 3.

Consider the voting intentions of the members of a large nation with a government (1) and an opposition party (2). Let $U_i^k(t)$ denote the utility a voter obtains under the government of party k at time t . It may be decomposed as

$$U_i^k(t) = w_k(t) + b_i^k(t) \quad (14)$$

where $w^k(t)$ is a measure of economic performance of party k at time t and $b_i^k(t)$ is a loyalty term specific to voter i . In other words, voters are alike in that they do not differ in their evaluation of a party's economic performance, although they do differ in their attachment (or lack of it) to each political party. The loyalty terms, $b_i^k(t)$, vary across voters, since they reflect the influence of a party's non-economic (social, moral, legal, etc.) policies and, more generally, the (proposed) party platform upon the loyalty of each voter and one would expect such influence to depend on individual tastes. Voter i votes for the party which gives him (her) the highest utility, that is, voter i elects party s only if the self-interest postulate

$$U_i^s(t) > U_i^k(t), \text{ for all } k \neq s \quad (15)$$

is satisfied. An implicit assumption underlying (14)–(15) is that voters hold political parties, at least partially, responsible for economic (mis-)management.

Suppose that the bias for the opposition over the ruling party, say $b(t) = b^2(t) - b^1(t)$, is distributed across voters according to the probability density function $f(b(t))$. It then follows that the proportion of votes going to the ruling party at time t , say $v(t)$, is given by

$$v(t) = \text{prob} \{b(t) < w^1(t) - w^2(t)\} = F(w(t)) \quad (16)$$

where $F(\cdot)$ is the cumulative density function of the bias terms at time t and $w(t) = w^1(t) - w^2(t)$ denotes the differential in economic performance between government and opposition. Since this paper is mainly concerned with the analysis of one election period and the opposition's performance index, $w^2(t)$, is determined by economic factors which occurred during previous election periods, one can set $w^2(t) = 0$ without loss of generality. It remains to explain the economic performance of the incumbent political party, $w^1(t) = w(t)$

Suppose this performance is determined by a weighted combination of all present and past successes and failures, say $\{W(t - j), j \geq 0\}$, and assume that the weights diminish as one goes back into time. For example, choose the exponential form with scaling factor $c(t) = \rho / [1 - \exp(-\rho t)]$ then

$$w(t) = c(t) \int_0^t \exp[-\rho(t - k)]V(k)dk, \rho \geq 0, 0 \leq t \leq T \quad (17)$$

where ρ is the rate of decay of voters' memories and T is the length of the election period. The parameter ρ is like a backward (rather than a forward) discount rate and in this sense resembles Pigou's 'defective telescopic faculty'

(cf. Nordhaus, 1975). Observe that any economic events previous to the current election period are ignored. This assumption is not too serious, since the analysis in the following sections is primarily concerned with $v(T) = F(w(T))$ and $\{V(k), k < 0\}$ would receive very little weight anyway. A much more important assumption is that $w(t)$ is not affected by $\{V(k), k > t\}$, so that (rational) expectations of future events by voters are ruled out. This assumption of myopic voting is crucial to the analysis of Sections 4–6 and 8.

The measure of current success, V , is assumed to depend on real personal disposable income, say $Y = (1 - \tau)Q$ (ignoring interest receipts from the government), the unemployment rate, u , the inflation rate, p , and the level of public spending, G , that is

$$V = V(Y, u, p, G), V_1 \geq 0, V_2 \leq 0, V_3 \leq 0, V_4 \geq 0 \quad (18)$$

One interpretation of the different arguments in $W(\cdot)$ is that they reflect the interests of different (pressure) groups in society (cf. van der Ploeg, 1984). For example, Y , u , p and G might reflect the interests of respectively wage and profit earners, unemployed, persons dependent on savings and state workers, including the part of the population dependent on the state.³ An alternative interpretation is that there are no interest groups, but that each individual values economic performance in an identical manner and is interested in Y , u , p and G .

Upon substitution of (17) and (18) into (16), one finally obtains an expression for the proportion of votes going to the ruling party, that is

$$v(t) = F\left[c(t) \int_0^t \exp(-\rho(t-k))V(Y(k), u(k), p(k), G(k))dk\right]. \quad (19)$$

Empirical support for the inclusion of Y , u , p and G in $V(\cdot)$ may be found in Goodhart and Bhansali (1970), Kramer (1971), Frey and Schneider (1978), Pissarides (1980), Hibbs (1982) and Borooah and van der Ploeg (1982a) and (1982b).

The next sections consider the influence of the proportion of votes cast in favour of the ruling party on economic policy. This influence derives from the observation that governments depend on survival and therefore re-election, ensured when $v(T) > \frac{1}{2}$, must be an important objective of economic policy. The re-election objective may be frustrated due to the behaviour of the state bureaucracy, which is interested in its own size (cf. managerial theories of the firm [Koutsoyannis, 1971]) and does not depend on voters for its survival, and the monetary authorities.

4. Government versus the bureaucracy, monetary authorities and the electorate

The behaviour of the three public authorities may be explained as follows. The

state bureaucracy simply maximizes its own size, proxied by G , subject to the constraint imposed by the incumbent political party (5), given the level of economic activity and the tax structure, τ . The monetary authorities follow a passive monetary rule of the form (7) (cf. Friedman, 1961). The government, that is, the incumbent political party, manipulates the rate of taxation to secure re-election. It can do this by choosing τ to maximize the proportion of votes cast at the next election, $v(T)$, subject to the constraints of the economy (1)–(13). One might argue that maximization of $v(T)$ is not realistic, since $v(T) \geq \frac{1}{2}$ would be sufficient to secure re-election. Here maximization of $v(T)$ is considered anyway, because the ruling party may attempt to flatter itself (or the individual politicians) by being as popular, or having as many seats in Parliament, as possible, or alternatively may attempt to safeguard itself against any undesirable uncertain events (see note 9). The postulated behaviour for the three public institutions corresponds to a Stackelberg (1952) hierarchical game with the government as leader and the state bureaucracy, the monetary authorities and the voters as followers.

For the purposes of this paper, the general problem of the optimal political business cycle may therefore be reduced to

$$\begin{aligned} \text{Max} \quad & \int_0^T \exp(\rho t) V[(1 - \tau)Q^*(G, \tau, L, p^e), \lambda\{\bar{Q} - Q^*(G, \tau, L, p^e)\}, \\ & \tau, p^*(G, \tau, L, p^e, \Delta), G] dt \end{aligned} \quad (20)$$

subject to the Nash-Cournot reaction function for the state bureaucracy

$$G = (\bar{g} + \tau)Q^*(G, \tau, L, p^e), \quad (21)$$

the rule for the growth in the real supply of money, $L = M/P$, adopted by the monetary authorities

$$\dot{L} = L[m - p^*(G, \tau, L, p^e, \Delta)], \quad (22)$$

and the adaptive expectations hypothesis

$$\dot{p}^e = \mu_4[p^*(G, \tau, L, p^e, \Delta) - p^e] \quad (23)$$

where m is exogenous and the issuing of new bonds, \dot{B}/r , follows from the government budget constraint (4). Upon substitution of (21) into (20), (22) and (23), one obtains the problem

$$\text{Max}_{\tau} \int_0^T \exp(\rho t) V^*(\tau, L, p^e, \Delta) dt \quad (24)$$

subject to

$$\dot{L} = L[m - p^{**}(\tau, L, p^e, \Delta)] \quad (25)$$

and

$$\dot{p}^e = \mu_4[p^{**}(\tau, L, p^e, \Delta) - p^e] \quad (26)$$

where

$$V_1^* = [V_1(\zeta - I_1 L_1 / L_2) - (V_2 - V_3 \mu_1) \lambda (1 - C_1) + V_4 Q_0^{** -1}] Q Q_0^{***},$$

$$V_2^* = [V_1(1 - \tau) - (V_2 - V_3 \mu_1) \lambda + V_4(\zeta + \tau)] (I_1 / L_2) Q_0^{***},$$

$$V_3^* = V_2^* L_3 + V_3 \mu_2,$$

$$V_4^* = V_3 \mu_3 / (1 - \tau) < 0,$$

$$p_1^{**} = \mu_1 \lambda (1 - C_1) Q Q_0^{***} > 0,$$

$$p_2^{**} = \mu_1 \lambda (I_1 / L_2) Q_0^{***} > 0,$$

$$p_3^{**} = L_3 p_2^{**} + \mu_2 > 0,$$

$$p_4^{**} = \mu_3 / (1 - \tau) > 0,$$

and the multiplier under the policy rule (21) is given by

$$Q_0^{***} = [1 - (1 - \tau)C_1 + (I_1 L_1 / L_2) - \zeta - \tau]^{-1} > Q_1^* > 0.$$

The multiplier Q_0^{***} is larger than the conventional multiplier (3), since as output is stimulated, for example, due to a higher level of the real stock of money or the expected rate of inflation, the state bureaucracy is allowed to expand more and this causes output to increase even further. The consequences of such a stimulus are an increase in disposable income and public spending and a reduction in unemployment. Each of these increase electoral popularity, although the resulting higher level of inflation might off-set the increase in popularity. Hence, the signs of V_2^* and V_3^* are undetermined. The effect of a marginal increase in the tax rate is to allow a bigger state bureaucracy, which stimulates output and employment, despite the depressing effects of a higher tax rate (cf. the Balanced Budget Theorem and (6)), and increases inflation. Disposable income is unaffected in the simple case of the Balanced Budget Theorem ($\zeta = 0$, $I_1 L_1 / L_2 = 0$). However, when the depressionary effects of crowding out dominate the expansionary effects of allowing a big state bureaucracy (when $I_1 L_1 / L_2 > \zeta$), a higher tax rate decreases disposable income. The lower level of unemployment and higher level of public spending raise electoral popularity, although the higher rate of inflation and possibly the lower level of disposable income tend to decrease electoral popularity.

Hence the sign of V_1^* is undetermined, although it is more likely to be negative than the signs of V_2^* and V_3^* . Finally, a maintained change in the expected direct tax rate causes a transitory increase in the inflation rate and therefore a transitory reduction in popularity.

The general problem (24)–(26) is discussed in Section 6. Before this is done, a special case is discussed. This case assumes that the electorate does not care about inflation ($V_3 = 0$) and that the monetary authorities pursue a policy of maintaining a constant stock of real money ($m = p$). The problem then reduces to a static allocation problem between competing pressure groups and is discussed in Section 5.

5. Reconciliation of competing interests in the economy

Political economics seeks to explain the behaviour of governments. The theory of economic policy focuses attention on the objective of stabilization and views the government as a benevolent dictator implementing economic policy in an attempt to reduce unemployment and inflation, ensure a satisfactory level of foreign reserves and increase economic growth. Most of the theory developed for this purpose has a normative character, since it is concerned with how a government *ought* to behave in order to achieve the objectives of economic policy. Such theory ignores the fact that a government has objectives of its own, manifested in its ideology and its attempts to secure re-election, which may well differ from the stabilization objective. Positive theories of how a government *actually* behaves are needed.

This paper assumes that the government represents the interests of various pressure groups in society and formulates economic policy accordingly. The interests of the private sector workers, public sector workers, unemployed and capitalists may be captured by the vote function (24). This is not entirely satisfactory, since some pressure groups may be more apathetic and others more successful in having their interests represented by government. In such a case the vote function (24) should be re-interpreted as an interest function, which captures the interests of the various pressure groups as much as possible.

As long as the electorate remembers something of the past performance of the government (ρ is finite), the government finds it optimal to choose economic policy to maximize the current measure of success (18) at each point of time. The government then chooses τ such that $V_1^* = 0$. When the unemployed component of the electorate is only interested in disposable income ($V_2 = 0$), the government equalizes the marginal rate of substitution between disposable income and state spending ($MRS = -V_4/V_1$) with the multiplier for disposable income with respect to state spending ($-(I_1 L_1/L_2 - \zeta)Q_0^{**}$). In other words, the iso-popularity contour should be tangent to the economic model

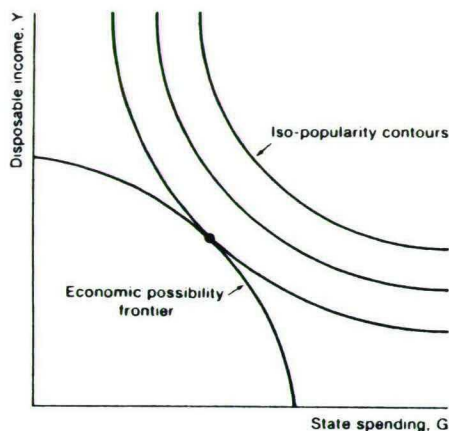


Figure 2. Political trade-off between the private and public sector

(see Figure 2). The optimal allocation between the private and public sector only exists when crowding out of private investment is sufficiently large, or when the permitted budget ratio is not too high, since then disposable income and state spending are inversely related. Allowing for the interests of the unemployed ($V_2 > 0$) is equivalent to reducing the magnitude of the marginal rate of substitution, hence the government increases state spending (at the expense of disposable income) in order to represent the interests of the unemployed.

Typically, a political-economic reaction function relating state spending to output results. For example, when $V = \gamma_1 \log Y + \gamma_4 \log G$, the optimal level of state spending equals $G = gQ = \{\gamma_4(1 + \zeta)/(\gamma_1(1/L_1 - L_2 - \zeta)Q_0^* + \gamma_4)\}Q$, where the ratio of state spending to output depends on the relative magnitudes of the 'power' parameters, γ_1 and γ_4 , the size of the multiplier and the permitted deficit ratio, ζ . This policy is very different from the Keynesian counter-cyclical type of stabilization policy, since $g > 0$ rather than $g < 0$ holds.

The above approach is related to the interest function approach to political economics (van Winden, 1982 and 1983), although there are two important differences. Firstly, the interest function approach disaggregates the economy more fully than Section 2 in order to distinguish between disposable income and (un)employment of each of the four interest groups and also distinguishes vote (or interest) functions for each pressure group. Although such a disaggregation is clearly desirable in view of the distributional consequences of economic policy, there are tremendous data problems and the analysis of disaggregated political-economic models is much more complicated. Secondly, the interest function approach (van Winden, 1982) takes a more naive view of the government. More specifically, it assumes that the government is ignorant of

the Keynesian multiplier, is only concerned with the constraint on the state bureaucracy (5) and therefore in formulating economic policy takes private sector and employment as given. For the example discussed above, such a strategy would lead to the rule $g^N = G/Q = \{\gamma_4(1 + \xi)/(\gamma_1 + \gamma_4)\} < g$. The naive strategy leads to a lower ratio of state spending to output, since it ignores the employment-generating effects of public expenditures. It is a matter for empirical investigation to decide on the most appropriate hypothesis.

6. Variations of the optimal political business cycle

This section highlights the features of the political business cycle. For the general problem it is difficult to obtain analytical results, hence a few special cases will be discussed.

6.1 No monetary feedbacks and no tax-indexation

The first case will be where the unions do not attempt to shift the burden of direct taxes to firms ($\mu_3 = 0$) and the money market does not feed back into the goods market ($I_1 L_1 / L_2 = 0$). The latter assumption is justified when there is either exogenous investment or a horizontal LM-curve (in other words the economy is at the lower end of the LM-curve, where money and bonds are perfect substitutes). Under these assumptions the general problem simplifies to

$$\text{Max}_{\tau} \int_0^T \exp(\rho t) V^*(\tau, \cdot, p^e, \cdot) dt \quad (24')$$

subject to

$$\dot{p}^e = \mu_4 [p^{**}(\tau, \cdot, p^e, \cdot) - p^e] \quad (26')$$

The solution follows from the stationarity condition $H_{\tau} = 0$ and the adjoint equation $\dot{\chi} = -H_{p^e}$, where

$$H \equiv \exp(\rho t) V^*(\tau, \cdot, p^e, \cdot) + \chi \mu_4 [p^{**}(\tau, \cdot, p^e, \cdot) - p^e]$$

defines the Hamiltonian and χ is the adjoint variable corresponding to equation (26') (see Bryson and Ho, 1969 for an exposition of optimal control techniques). Upon solving for χ from $H_{\tau} = 0$, differentiating χ , substituting χ and $\dot{\chi}$ into $\dot{\chi} = -H_{p^e}$ and rearranging, one obtains the differential equation

$$\dot{X} = [\mu_4(1 - \mu_2) - \rho]X + \mu_4\mu_2V_3 \quad (27)$$

in terms of the variable $X \equiv V_1^*/p_1^{**}$.

To obtain an explicit solution one needs to make further assumptions about the popularity function (18). Choosing $V_1 = \nu_1$, $V_2 = -\nu_2u$, $V_3 = -\nu_3$ and $V_4 = \nu_4$ and linearizing the consumption function, one can rewrite equation (27) as

$$\dot{u} = [\mu_4(1 - \mu_2) - \rho](u + A) + B \quad (27')$$

where $A \equiv (\nu_1\zeta + \nu_4Q_0^{**})/[\nu_2\lambda(1 - C_1)]$ and $B \equiv -\mu_1(\mu_4 - \rho)\nu_3/\nu_2$. Solving (27') gives the optimal unemployment trajectory

$$u(t) = u_0 - (u_0 - \bar{u})\exp\{[\mu_4(1 - \mu_2) - \rho](t - T)\} \quad (28)$$

where the unemployment rate attained on election eve follows from $\lim_{t \uparrow T} \chi(t) = 0$ and is given by

$$\bar{u} = \lim_{t \uparrow T} u(t) = \nu_3\mu_1/\nu_2 - A$$

and the unemployment rate attained immediately after the election is given by

$$u(0) \equiv u_0 = \nu_3\mu_1(\mu_4 - \rho)/\{\nu_2[\mu_4(1 - \mu_2) - \rho]\} - A > \bar{u}.$$

Since $dG = -du/(\lambda Q_1^{**})$ and $d\tau = -[\lambda(1 - C_1)QQ_0^{**}]^{-1}du$ hold, both G and τ are inversely related to u . Representative simulations based on (28) are presented in Figure 3.

Unemployment (state spending) decreases (increases) gradually over each election period and is raised (reduced) instantaneously after each election, since $u_0 \geq \bar{u}$. A low value of $[\mu_4(1 - \mu_2) - \rho]$ implies that the government implements most of the popular policies near election eve, because an electorate with a high rate of memory loss does not remember much of the earlier policies anyway and an economy with little compensation for increases in the costs of living and slow formation of expectations does not care too much about the post-election inflationary consequences. The inflation rate rises over the election period and follows a much smoother path due to the gradual adaptation to changes in the costs of living. As election eve approaches the government is prepared to finance an expansion of the state bureaucracy, by raising direct taxes, to stimulate unemployment, whilst deceiving the electorate by ignoring the inflationary consequences for the period following the election, in order to gain popularity and increase the chances of re-election. Immediately after

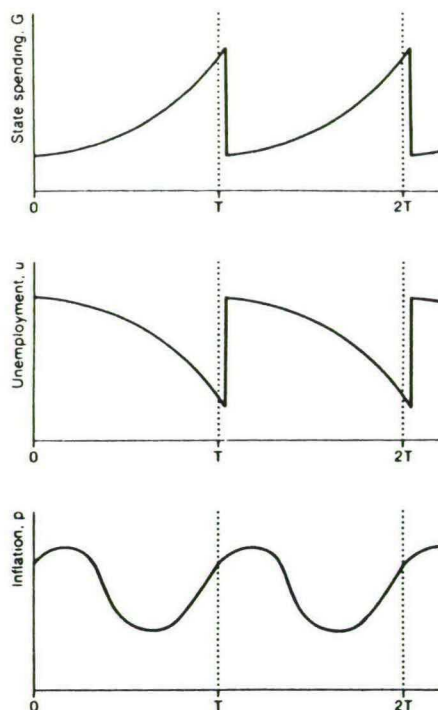


Figure 3. Public spending, unemployment and inflation in the optimal political business cycle without monetary feedbacks

each election the new government raises unemployment, by cutting the expenditures of the bureaucracy, to a high level in order to combat inflation. This recurring political decision making causes the political business cycle.

The extent to which a government is prepared to force down unemployment increases as the importance of inflation to the electorate diminishes and the importance of disposable income (assuming $\zeta > 0$), unemployment and public spending to the electorate increases. A 'Keynesian' government, defined as allowing a rather large state bureaucracy (high ζ), is more likely to stimulate the economy in order to win the votes of persons interested in disposable income. A Conservative administration is more likely to attract middle-class voters (Borooah and van der Ploeg, 1982c) and to serve them (cf. the 'clientele hypothesis' [Tufté, 1978; Hibbs, 1977]). Since middle-class voters are more concerned with inflation (Hibbs, 1982), a Conservative government is less likely to force down unemployment for political reasons. Finally, observe that in taking account of disposable income and public spending the government forces unemployment during the election cycle below what it would be in the Nordhaus (1975) model.

The assumptions of the Nordhaus (1975) case ($V_1 = V_4 = 0$) of this version of the political business cycle have been strongly criticised by Chrystal and Alt (1979) for two reasons. The first reason is that inflation enters linearly whereas unemployment enters quadratically into the popularity function (18). This is not a serious critique, since MacRae (1977) has shown how to allow for a fully quadratic popularity function. The second reason is that 'while actors form inflation expectations for their wage bargain, they do not let these expectations influence their voting behaviour' and that this 'inconsistency' would eliminate the cycle. Replacing (18) by the function $V(Y, u, p^e, G)$ and repeating the analysis, one obtains (for the case $V_1 = V_4 = 0$) the following unemployment trajectory

$$u(t) = \nu_3 \mu_1 \mu_4 / [\nu_2 \{\mu_4(1 - \mu_2) - \rho\}] \{1 - \exp[\{\mu_4(1 - \mu_2) - \rho\}(t - T)]\} \quad (28')$$

From (28') it follows that the unemployment rate immediately after an election is higher than in the Nordhaus (1975) case and that the unemployment rate at election eve is forced down to zero and is therefore lower than in the Nordhaus (1975) case. Removing the criticised inconsistency in the popularity function actually gives the government a better chance to deceive the public and therefore accentuates rather than eliminates the political business cycle. This argument invalidates the second critique of Chrystal and Alt (1979b). This paper sticks to equation (18), because it assumes that the electorate knows the outcome of the *historical* inflation rates at election eve.

The electoral cycle described in this section depends crucially on myopic voting and adaptive expectations of the inflation rate. For example, when expectations are perfect ($\mu_4 = \infty$, $p^e = p$) the government does not vary unemployment over the election period, but sets it to a constant rate, $u = \nu_3 \mu_1 / [\nu_2 (1 - \mu_2)] - A$, equal to the one which would prevail immediately after election eve. The electoral cycle also disappears under strategic voting (see Section 7).

6.2 Crowding out and disposable income

The tax rate in the version of the electoral cycle discussed in Section 6.1 increases over the election period in order to allow an expansion of public demand and to stimulate the economy. This was possible, because raising taxes (combined with raising state spending) actually increased disposable income. When monetary feedbacks are considered, such an expansion may cause crowding out and depress disposable income. The consequences of such monetary effects for the development of the optimal tax rate are discussed in this subsection.

Consider first the case where the monetary authorities adjust the growth in

the nominal supply of money to equal the rate of price inflation. This is a policy of maintaining a constant stock of real money, L , or bond-finance and therefore the solution procedure of Section 6.1 may be used. The optimal unemployment trajectory is still given by equation (28), except that the parameter A is replaced by

$$\hat{A} \equiv [\nu_1(\zeta - I_1 L_1 / L_2) + \nu_4 Q_0^{*-1}] / [\nu_2 \lambda (1 - C_1)] < A$$

It is clear that there is still an electoral cycle of the type presented in Figure 3, although the unemployment rate at each point of the election period is higher and the tax rate is lower than without crowding out.

Raising taxes and state spending stimulates output and employment, raises the demand for money for transactional purposes and therefore leaves less funds for speculation. This bids up the real rate of interest, depresses private investment and reduces output to below what it would be without crowding out of private investment. When $I_1 L_1 / L_2 > \zeta$, the process of crowding out decreases disposable income and this explains why the government finds it optimal to implement a weaker package of demand management than before.

An alternative rule to adopt for the monetary authorities is a constant (growth in the) nominal supply of money (cf. Friedman, 1961). In addition to the static implications for taxation policy, observed for the rule of maintaining a constant real stock of money, there will be dynamic effects due to the gradually increasing inflation rate over the election period. Such an increase in inflation would cause a gradual decline in the real stock of money, so that crowding out of private investment would become stronger over the election period. This process is just the consequence of increasing prices combined with a downward-sloping aggregate demand curve. The implication of the above argument is that it may be no longer possible for a government to stimulate the economy (at the expense of a moderate increase in inflation) towards election eve.

There is another reason why maintaining a constant nominal, rather than real, supply of money is less likely to lead to electoral cycles. In the case of maintaining a constant real stock of money, an increase in inflation serves as an increase in a 'selective excise tax' on holdings of real balances of money and therefore reduces the real value of the public debt, even if the government budget is balanced (Bailey, 1956). Rewriting equation (4) in real terms

$$\dot{L} + \dot{b}/r = (G - \tau Q) + (1 - \tau)b - (L + b/r)p, \quad b \equiv B/P \quad (4')$$

illustrates the point. It gives a public revenue motive for inflationary finance (cf. Brittan, 1978; Burton et al., 1981), which is not an option under maintaining a constant nominal supply of money. It is clear that there may well be conflict between the political motives underlying government policy and the policy adopted by the monetary authorities.

So far this section assumed that the expected inflation rate only affects the wage-price adjustment. However, it also represents minus the expected return on money, so that an increase in the expected inflation rate diminishes the demand for money, forces down the real rate of interest and stimulates private sector investment. Hence, a policy of depressing expectations of the inflation rate in the early part of the election depresses the inflation rate in the latter part, but *also* depresses output and employment in the latter part. This effectively means that there is less scope for raising electoral popularity by demand management.

6.3 Autonomous behaviour of the state bureaucracy

The previous sections argued that a government may find it optimal to stimulate state spending by raising taxes in order to gain political popularity. Some might argue that a government may also find it optimal to reduce taxes over the election period, since this would *ceteris paribus* stimulate output and employment and increase disposable income. Such arguments, however, require a different explanation of the behaviour of the state bureaucracy.

Adopting the view that the implementation of planned state expenditures is often pre-determined and takes some time while it is difficult to scrap state projects once the decision to build has been made, one can no longer adhere to hypothesis (5). A permanent income model, previously used in studies of the consumption function (Friedman, 1956), of state expenditures is, in such a case, perhaps more realistic (cf. Chrystal and Alt, 1979a, 1981b). Assume, therefore, that state spending is a certain fraction of permanent income to the state, say Q^P ,

$$G = \alpha Q^P, \quad 0 \leq \alpha \leq 1 \quad (29)$$

and that permanent income of the state is a weighted average of all previous incomes to the state, proxied by output of the economy, say

$$Q^P = \int_0^{\infty} T(k)Q(t-k)dk, \quad T(k) \geq 0, \quad \int_0^{\infty} T(k)dk = 1 \quad (30)$$

Choosing exponential weighting, say $T(k) = \beta \exp(-\beta k)$, one obtains the following model for state expenditures

$$\dot{G} = \beta(\alpha Q - G), \quad \beta \geq 0 \quad (21')$$

where the coefficients α and β^{-1} may be interpreted as the long-run value of $(\xi + \tau)$ and the average implementation lag of state expenditures, respectively.

State spending, as explained by equation (21'), is no longer dependent on short-run changes in the rate of taxation or output, but instead depends simply on the trend value of output. Empirical evidence for such a hypothesis may be found in Chrystal and Alt (1981a, 1981b). Two implications of (21') are that a government finds it more difficult to use state spending as a political instrument, since state spending very much follows its own course (independent of taxation policy), and that the bureaucrats prevent the use of state spending as a counter-cyclical policy instrument. In other words, most of government action must come from the revenue rather than the expenditure side of the public sector.

The problem of the optimal political business cycle under the alternative behaviour of the state is now described by equations (20), (21'), (22) and (23). Let the monetary authorities adopt a passive monetary policy ($m = p$) and let the government rely on bond-finance, so that the real stock of money, L , is constant. Assuming there is no tax-indexation ($\mu_3 = 0$) and re-working the procedure underlying equations (24)–(28), one easily obtains the solutions for the two special cases $\beta = 0$ and $\beta = \infty$. The optimal unemployment trajectory is still given by equation (28), although the term A is replaced by

$$\hat{A} \equiv [\nu_1(1 + I_1 L_1 / L_2 - \hat{\alpha}) + \nu_4 \alpha C_1] / (\mu_1 \lambda C_1)$$

where $\hat{\alpha} = 0$ if $\beta = 0$ and $\hat{\alpha} = \alpha$ if $\beta = \infty$. The optimal tax trajectory then follows immediately using the relationship

$$d\tau = \lambda C_1 Q du / [1 - (1 - \tau)C_1 + I_1 L_1 / L_2 - \hat{\alpha}].$$

The optimal unemployment trajectory has the same shape as in Figure 3, although the optimal tax rate now decreases over the election period and is raised to a high value immediately after the election. With (21) cuts in the rate of taxation reduce state spending, output and, if crowding out is not too strong, disposable income. But with (21') the consequences are an increase in state spending, output and disposable income, because the bureaucrats will no longer allow the ratio of state spending to output to be decreased. Tax cuts now have beneficial impacts on output, employment and disposable income, hence the government finds it worthwhile to decrease the tax rate towards election eve. A sluggish bureaucracy ($\beta = 0$) gives rise to smaller multipliers and therefore requires larger tax cuts than a bureaucracy with no implementation lags ($\beta = \infty$). Also a sluggish bureaucracy gives rise to a lower unemployment trajectory, because a cut in the tax rate increases disposable income by a greater amount and thus improves the trade-off between unemployment and disposable income.

In the general case ($0 < \beta < \infty$) the tax rate probably still decreases over the

election period and is raised immediately after each election, but state spending follows a much more smoothed, that is, less political, path than the path presented in Figure 3.

The truth presumably lies somewhere inbetween equations (21) and (21'), that is, in practice there are implementation lags in state projects and *short-run* effects of the rate of taxation on the ratio of public spending to permanent income (cf. Section 9.2). Such a hypothesis might explain that Chrystal and Alt (1982b) find in their empirical study a version of (21') augmented with two terms in p and u , both with a positive coefficient, since an increase in the tax rate increases both p and u .

The above discussed reasons, related to the behaviour of the state, why a government might find it optimal to gradually reduce the tax rate over the election period. However, a government may also cut taxes towards election eve in order to secure a transient reduction in inflation and thereby increase popularity. These matters are discussed in the next sub-section.

6.4 Tax-indexation

In this section the potential for political exploitation of tax-indexation is briefly discussed. For simplicity assume that $m = p = p^e$ and $L_3 = 0$. The government then chooses τ to maximise

$$\int_0^T \exp(\rho t) V^\dagger(\tau, \cdot, \cdot, \Delta), V_i^\dagger = V_i^* / (1 - \mu_2), i = 1, 4 \quad (24'')$$

subject to the adaptive expectations hypothesis for the expected change in the rate of taxation (cf. (13))

$$\dot{\Delta} = \eta(\dot{\tau} - \Delta), \eta \geq 0 \quad (31)$$

The optimal tax rate satisfies the differential equation

$$\dot{V}_1^\dagger + \eta \dot{V}_4^\dagger = \eta V_1^\dagger$$

where the initial tax rate satisfies $V_1^\dagger = 0$ and the final tax rate satisfies $V_1^\dagger + \eta V_4^\dagger = 0$. Choosing the same functional form for the popularity function as in Section 6.1, it follows that the unemployment rate immediately after an election is as before (with $\mu_4 = \infty$ of course) and the unemployment rate on election eve is given by

$$\bar{u} = u_0 + \eta \nu_3 \mu_3 / [\nu_2 (1 - \mu_2) \lambda (1 - C_1) Q Q_0^{***}] > u_0.$$

Since the final unemployment rate exceeds the initial rate, there is a political business cycle. The government gradually reduces the tax rate over the election period, since this reduces inflation and, if crowding out is not too strong, increases disposable income at the expense of a moderate decrease in output and employment. Immediately after the election taxes and therefore output and employment are raised, so that the election cycle can commence again.

7. Rational voters and social optimal policies

The type of political decision making discussed in the previous section deceives the voters and therefore relies on a naive evaluation of the incumbent political party. In other words, the electorate is presumed to know what it likes, but fails to understand (and take account of) the interactions between politics and the economy. A more rational electorate does not only care about the track record of the various political parties, but would also penalise any undesirable actions occurring after the election. When a government takes account of a rational electorate, it might simply implement the social optimal policies. The purpose of this section is to contrast the policies adopted in the political business cycle with the policies adopted at the social welfare optimum and to examine the actions the electorate can undertake in order to eliminate the election cycle.

The social welfare optimum is obtained by choosing τ to maximize social welfare (instead of (24))

$$\int_T^{\infty} \exp[\hat{\rho}(t - T)] V^*(\tau, L, p^e, \Delta) dt, \quad 0 < \hat{\rho} (< \rho) \quad (33)$$

where $\hat{\rho}$ denotes the forward-looking social rate of discount, subject to equations (25) and (26). Typically the social rate of discount is smaller than the rate of memory loss, ρ , used in the vote function.

The equilibrium strategy of the social welfare optimum⁵ under the monetary policy $m = p$ (and the case $L_3 = \mu_3 = 0$) satisfies the relationship

$$\frac{\mu_4 + \hat{\rho}}{\mu_4(1 - \mu_2) + \hat{\rho}} \mu_1 = MRS = \{V_2 - [V_1(\xi - I_1 L_1 / L_2) + V_4 Q_0^{*-1}] / [\lambda(1 - C_1)]\} / V_3. \quad (34)$$

The term in curly brackets equals the reduced gradient of the current measure of success, W , with respect to the unemployment rate. This term reflects a direct effect and two indirect effects, since in the reduced form (of this special case) both disposable income and state spending can be explained in terms of the unemployment rate only. Plotting the iso-success contours and the wage

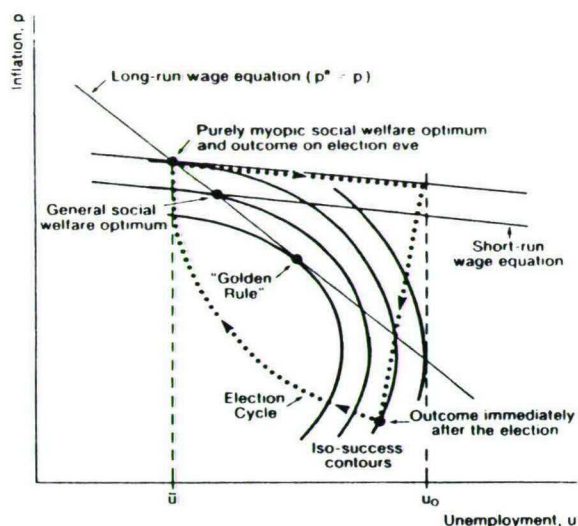


Figure 4. Welfare properties of the political business cycle

equation in Figure 4 yields valuable information about the social optimal policies. Indifference between the welfare of current and future generations, or no discounting ($\hat{\rho} = 0$), leads to the 'golden-rule', that is the iso-success contour must be tangent to the long-run wage equation ($MRS = \mu_1 / (1 - \mu_2)$). Concern with only the present generation, or infinite discounting ($\hat{\rho} = \infty$), leads to the purely myopic social welfare optimum, that is where the iso-success contour is tangent to the short-run wage equation ($MRS = \mu_1$). The general welfare optimum ($0 < \hat{\rho} < \infty$) requires that the marginal rate of substitution between the rate of inflation and the unemployment rate equals a constant somewhere in between the slope of the short-run and long-run wage equation ($\mu_1 < MRS < \mu_1 / (1 - \mu_2)$).

It is interesting to examine the welfare properties of the path attained in the political business cycle. It is easily seen that the outcome on election eve corresponds to the purely myopic welfare optimum, since at that point the politicians ignore future generations completely. The outcome immediately after the election corresponds to the social welfare optimum with a negative rate of discount ($\hat{\rho} = -\rho < 0$).⁶ In the extreme case where voters do not reward past performance at all, or complete memory loss ($\rho = -\infty$), the political business cycle disappears and the government simply puts the economy at the purely myopic social welfare optimum on election eve and is free to do what it wants at other times. In the unlikely case that the electorate remembers all past political successes and failures equally well ($\rho = 0$), the outcome after the election corresponds to the 'golden-rule' strategy. In the general case the optimal unemployment rate immediately after the election is never above what it is on

election eve (cf. Sections 6.1 and 6.2). The unemployment rates in the political business cycle may start off lower than in the 'golden-rule' (see example in Figure 4), but always end up at the purely myopic social welfare optimum. A typical election cycle is also drawn in Figure 4.⁷ There is no clear evidence that democratic systems with regular elections have a higher propensity to inflate or operate at lower levels of unemployment than the social optimum outcomes ($0 < \hat{p} < \infty$).

It is interesting to examine whether the electorate by changing their voting pattern to a strategic tactic, that is taking account of the political actions of the government, can eliminate the political business cycle. One way of achieving such a strategic goal is for the electorate to change its preferences *on* election eve (cf. MacRae, 1977) and thus penalize economic cycles caused by the government. The required change in the pattern of voting could be induced by the press, which has the advantage that the government would also be informed and has an opportunity to modify its actions. The preferences may remain the same at all points of time before the election, but on election eve the electorate must increase the importance of inflation or reduce the importance of unemployment (in the measure of current success (18)) to persuade the government to undertake a deflation of demand in order to have the same outcome on election eve as just after the election. Such a deflation would naturally eliminate the political business cycle. For example, in the case of Section 6.1 and 6.2 the electorate simply raises the relative weight of inflation with respect to unemployment on election eve to

$$(\nu_3/\nu_2)[(\mu_4(1 - \mu_2) - \rho)/(\mu_4 - \rho)] > (\nu_3/\nu_2)$$

and thereby changes the boundary condition to ensure $\bar{u} = u_0$.

As far as the electorate is concerned, there is a trade-off between conventional and strategic voting. The former causes economic instability, whereas the latter puts the economy at the purely myopic social welfare optimum with relatively high inflation and low unemployment. It is not clear whether voters prefer stability or short-sightedness.

The next section will show, however, that a government might avoid myopic decision making when the objective of vote maximization at the forthcoming election is abandoned.

8. Strategic behaviour of governments

It is not clear whether it is advisable for a government to maximize votes at the forthcoming election when it also aspires to win the election after a possible second term in office. When the government has some political slack at the next election, it may prefer not to create a pre-election boom in order to avoid

the inflationary consequences during a possible second term in office and spoil the chances for re-election. The same argument applies when the government is confident of winning the first and second election, since then it will neither create a pre-election boom for the first nor for the second election in order not to spoil the chances for the third election. The implicit strategy underlying the above reasoning may be formalized as follows. The government maximizes the number of uninterrupted terms in office, say K , so that the government chooses τ and the largest K to satisfy the economic constraints (25)–(26) and the re-election constraints

$$v(kT) \geq 0.5 + \epsilon \text{ (or } \hat{v}(kT) \hat{\epsilon}), k = 1, 2, \dots, K - 1 \quad (34)$$

where ϵ and $\hat{\epsilon}$ are safety margins. This formulation ignores any utility derived from returning to power after a period out of office. One way to find the maximum number of uninterrupted terms in office is to solve the problem $\{\text{Max}_{\tau} v(KT) \text{ subject to (25)–(26) and (34)}\}$ sequentially for $K = 1, 2, \dots$ until an infeasible problem is reached. The final K then gives the maximum number of terms in office. The optimal trajectory for the policy instrument τ then follows from the first order conditions associated with the Lagrangian

$$L = v(KT) + \sum_{k=1}^{K-1} \psi_k v(kT), \psi_k \geq 0 \quad (35)$$

subject to equations (25)–(26). Although the solution to this problem is complicated,⁸ a few general comments can be made.

The variable ψ_k is the shadow price of increasing the safety margin at the k -th election, that is, the marginal decrease in votes at the election after the last term in office due to a unit increase in ϵ . This variable must, of course, be zero when the government expects to enjoy political slack at the k -th election ($v(kT) > 0.5 + \epsilon$), otherwise the k -th election is crucial (biting) and $\psi_k > 0$. In the case that there are no bottle-neck elections previous to the K -th election the government simply maximizes $v(KT)$ subject to equations (25)–(26). This has the effect of lengthening the election period from T to KT periods, so that the political business cycle is spread out over a longer period. This has the advantage that there are less economic fluctuations caused by political actions and less time is spent near the myopic outcome on election eve. It is, however, possible that a government has to undertake corrective actions to secure the winning of a bottle-neck election. This implies increasing the weight $\exp(\rho t)$ in (24) to

$$\exp(\rho t) [1 + \psi_k \exp[(K - k)t]] \text{ for } t \in (0, kT) \quad (36)$$

and leaving the weight unaffected for $t \in (kT, KT)$, where k denotes the bottle-neck election. The effect of increasing the weight on the current measure of success before the biting election is that the government creates a sufficiently large boom to secure the victory in the bottle-neck election, but uses any remaining degrees of freedom to secure the K -th election. The result is a short-run political business cycle superimposed on a political cycle with a longer period.

Frey and Ramser (1976) use a similar objective of maximizing the expectation of the uninterrupted length in office, but interpret the share of votes cast in favour of the government, $v(t)$, as the probability of winning an election at time t .⁹ Hence, the government maximizes the expected length in office

$$\sum_{k=1}^{\infty} Z_k, Z_1 = v(T), Z_K = v(KT)Z_{K-1} \quad (37)$$

where Z_K denotes the probability of being K uninterrupted terms in office. Assuming that elections are held continuously, Frey and Ramser (1976) approximate (37) by

$$\int_0^{\infty} Z(K)dK, Z(0) = v(0), \dot{Z} = \{v(KT) - 1\}Z \quad (37')$$

Assuming that the electorate suffers from complete memory loss ($\rho = \infty$)¹⁰ and maximizing (37') subject to equations (25)–(26), one obtains, for the case $m = p$ and $L_3 = \mu_3 = 0$, the steady-state solution (34) with the discount rate, $\hat{\rho}$, replaced by the probability of not being re-elected, $1 - v(\cdot)$. A government facing defeat therefore discounts the future heavily. The resulting unemployment rate is less than the 'golden-rule' and higher than the purely myopic welfare optimum, hence the optimal unemployment rate is no longer purely myopic in democratic systems as long as the government changes its objective from maximizing the probability of winning the next election to maximizing the expected length in office.

The above assumed that the government does not value a return to office after a period in opposition, although considerations of this type may alter the behaviour of an outgoing administration. For example, a government with the prospect of losing the next election may prefer to lose dramatically in order to leave the incoming government worse off and thereby increase the chances of winning the election after the next. Formal analysis of such behaviour involves issues of blame and will be left for future research.

9. Concluding remarks

An IS–LM model of the goods and money markets was extended with a sim-

ple model of the state bureaucracy, Okun's law and a price- and tax-augmented Phillips-curve to obtain an explanation of disposable income, unemployment, inflation and state spending in terms of past and current levels of the rate of taxation. This was followed by a qualitative choice theory of government popularity, whereby the (intended) vote share was related to past and current levels of disposable income, unemployment, inflation and state spending. To obtain a closed political-economic model, the paper assumed that the government employed the tax rate to manipulate votes and maximize the probability of re-election. This led to three approaches to the formulation of political tax strategies.

The first approach sets the tax rate to reconcile the interests of competing pressure groups and thus obtains a political trade-off between the private and public sector. This approach concentrates on a static allocation between the different interest groups. The second approach focuses on the dynamics of inflation expectations and the resulting opportunities for political exploitation. It relies on a naive electorate and excludes strategic voting. It was shown to be optimal for a government to reflate the economy, by raising taxes to finance an expansion of employment-generating state projects, towards election eve in order to gain votes and lumber the incoming administration with the inflationary consequences. Tighter control of the state, crowding out of private investment, beneficial impacts of higher expected inflation on real quantities, high electoral value of inflation and low electoral values of disposable income, unemployment and state spending attenuate the election cycle. A different hypothesis for the state bureaucracy, which explains state spending by the trend level of output and is independent of tax policy, leads to quite different results. Now the bureaucrats prevent the use of state spending as a political instrument and therefore the tax rate must be *cut* towards election eve in order to gain votes. Tax-indexation can also be exploited, since the government can, by cutting taxes and thereby reducing inflation, gain popularity towards election eve, despite the cuts in state projects and higher levels of unemployment. The third approach considers the objective of maximizing the expected uninterrupted length in office and results in a short-run political business cycle superimposed on a longer cycle. For the special case of an electorate with no memory, the election cycle disappears and the outcome corresponds to a non-myopic political welfare optimum with the discount rate equal to the probability of not being re-elected.

There remain a number of avenues to be explored. More realistic economies with multiple sectors and international linkages may be considered. The many economic lags, for example, occurring in the balance of payments adjustment, may be politically exploited in the same manner as adaptive expectations of inflation and tax policy. Also the political aspects of the model require further disaggregation. For example, the economy and the electorate may be *explicitly*

divided into a number of (mutually exclusive) pressure groups with different interests and voting patterns (cf. van Winden, 1982, 1983). The emphasis on conflict between a-political, that is, independent of (general) re-election, public sector institutions, for example, the state bureaucracy, Central Bank, trade unions, local authorities, etc., and the incumbent political party could be further investigated, since the paper concentrated on the conflict between state and government only. For example, Frey and Schneider (1981) have performed a study of the conflict between the Bank and the government and Gärtner (1981) investigated political reasons for the leaders of a centralized trade union to recommend political wage rises. These studies are only a first step. The government might maximize ideology subject to attaining sufficient votes to secure re-election. This means pursuing a fairly ideological policy, specific to the colour of the incumbent political party, at the start of the election period and progressive adjustments to ensure re-election towards the end of the period. Some argue that the political business cycle is incompatible with the rational expectations hypothesis, since political exploitation of lags would be 'seen through' under rational expectations and therefore be impossible. The relationship between these two lines of thought requires further attention. Although a number of studies (e.g., McCallum, 1978; Minford and Peel, 1982) argue that the political business cycle disappears, van der Ploeg (1987) shows, within the context of a real-exchange-rate overshooting model of a small open economy with rational expectations and sluggish labour markets, that the ideology of the incumbent government is 'coloured' by the ideology of a prospective future government and that political uncertainty can lead to significant jumps in the economy on the morning after the election.

Notes

1. A subscript i denotes a partial derivative with respect to the i -th argument.
2. The solid arrows denote effects occurring during the election period under consideration. The broken arrows denote effects occurring outside the election period under consideration.
3. Of course, in practice it is difficult to assign each argument in $V(\cdot)$ to one particular group in society. Wage and profit earners might also be interested in the level of public spending and state workers may also be interested in the unemployment rate. Van Winden (1982) develops the related concept of an interest function, whereby the interests of four pressure groups, capitalists, private sector workers, public sector workers and dependents on the state, were distinguished. This implies that Y in $V(\cdot)$ should be decomposed into disposable wage and profit income, but this was not done as this paper assumes a constant share of labour in value added (see (8)).
4. The special case of the chosen popularity function corresponding to $V_1 = V_4 = 0$ has been used by Nordhaus (1975) in his pioneering article and corresponds to $A = 0$. More general functional forms of (18) usually require (27) to be solved in terms of the policy variable, τ , rather than the unemployment rate, u .

5. For the classical exposition of this type of problem refer to Phelps (1967) and for details on the transitional dynamics refer to Turnovsky (1981).
6. The use of the term social welfare optimum in this case is somewhat perverse, since the equilibrium is no longer stable.
7. The shape is very different from the cycle suggested in Figure 2 of Frey (1978a).
8. In principle one can find a solution to the problem by defining the Hamiltonian as before (see Section 6.1) but replacing $\exp(\rho t)$ by (36), expressing the optimal outcomes in terms of the non-zero ψ_k , substituting these into the active constraints of (34) and finally solving for the non-zero ψ_k .
9. This requires an extension of the theory proposed in Section 3. Change (16) to $v(t) = F(w(t)) + \epsilon(t)$, where $\epsilon(t)$ denotes an error term to allow for uncertain political events of the moment (e.g., World Cup, Falklands crisis, etc.). The probability of winning an election equals $\text{prob}[v(t) > 0.5] = 1 - F_\epsilon[0.5 - F(w(t))]$, where F_ϵ is the cumulative density function of ϵ_t . When ϵ_t is taken from a uniform distribution, this probability is linearly related to $w(t)$. Hence (17) may be used as the maximand for the probability of winning the next election.
10. Frey and Ramser (1976) make a somewhat peculiar assumption here, since when the voters have no memory the political business cycle disappears.

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Reprint Series, CentER, Tilburg University, The Netherlands:

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